Attachment 1 - Snag Calculations

Data from 1998 snag surveys in EF Coquille Watershed for mid-seral stands (30-80 yrs old):

	Snags/acre
Average:	2.25
Upper Limit:	3.02
Lower Limit:	1.47

To be on the conservative side, it was agreed to use the lower limit value of **1.5 existing snags per acre** for snag calculations rather than the average.

Data from post-treatment commercial thinning surveys (table below):

Average number of trees with broken tops: 4.6 trees per acre

Based on the data above, it was agreed that there would be at least **one snag per acre** as a result of a tree losing it's top during the treatment.

It was determined that at least **2.5 snags per acre** would exist after completion of treatment. This was based on combining 1.5 existing snags per acre with the one broken top (snag) per acre.

The goal of the LSRA is to retain at least 3 snags per acre on the north-facing slopes and 1 snag per acre on the south-facing slopes on completion of any density management treatment. The 2.5 snags per acre, calculated above, exceeds the amount recommended for south-facing slopes. It was agreed to include a design feature that would top an additional tree per acre on north-facing units. Combining the 2.5 existing snags per acre with the additional topped tree per acre on north-facing units would bring the total to 3.5 snags per acre. This would exceed the amount recommended for north-facing slopes.

Post Harvest Damage Assessment for Commercial Thinning Units

Timber Sale	# Broken/Dead Top Trees Per Acre
Harry's Road Thinning	2
Rock Creek Thinning # 1	15.5
Rock Creek Thinning # 4	9
Chopper Rock Thinning # 1C	0
Rock Again	0
Soup Creek Thinning	4
Fireroad Thinning	1.7

Average:		**4.6**

Attachment 2 - Down Log Calculations

In developing the down log recommendation, two components were addressed: 1) short- term down logs (decay Class 2), and 2) total down wood that is 4" diameter and larger in all decay classes.

Decay Class 2 - Short-term Down Log Volume

Log volumes for decay Class 2 component found in young natural stands range from 13 to 64 cu.ft per acre (Spies et. al 1991). One tree per acre left on site as down wood equals approximately **46 cu.ft. per acre** (calculated below).

> Data from SPS shows that the average diameter for DF leave trees is 15 inches with the average total height of 100 feet.

> Using a 15" diameter tree with a total height of 100 feet = 45.9 cu. ft. per tree *

> * Table C-2, Conversion Factors for the Pacific Northwest Forest Industry

The design features includes leaving one tree per acre after completion of thinning activities to provide for short-term down wood. This amount falls within the range expected to be found in natural stands of this age for Class 2 component.

Total Down Wood Volume (4" diameter and larger) - All Decay Classes

Based on down log surveys conducted in the EF Coquille Watershed, there is 270 cu.ft. per acre of all decay classes 16" in diameter and larger. Since data was not collected on 4" to 16" diameter down logs, USDA Forest Service General Technical Report PNW-105 (pg 36) data was used to estimate this component. Table 1-DF-2 describes a stand with 269 trees per acre and an average dbh of 11 inches. This closely resembles the action alternative(s) units which have average of 270 trees per acre with an average dbh of 12 inches.

The data from Table 1-DF-2 shows the following:

> 4" to 16" diameter down material = 881 cu.ft./acre
> 16" diameter and larger material = 663 cu.ft./acre

Using the above information, the following calculation was used to estimate log volume of 4" to 16" diameter material on the ground.

> $\dfrac{4" \text{ to } 16" \text{ (Table) } 881 \text{ cu.ft./acre}}{16" + \text{(Table) } 663 \text{ cu.ft./acre}}$ = $\dfrac{4" \text{ to } 16" \text{ (on-site) X}}{16" + \text{(on-site) } 270 \text{ cu.ft./acre}}$ = 359 cu.ft./acre

Estimated total down wood 4" diameter and larger (all decay classes):

Existing 4" to 16" diameter down wood per acre:	359 cu. ft.
Existing 16" + down wood per acre:	270 cu. ft.
Tree left for short-term (Decay Class 2) down wood per acre:	46 cu. ft.
Totals:	**675 cu. ft.**

This amount of total down wood is within the range of total down wood (4" diameter and larger, all decay classes) shown in Table 10 of the LSRA (525 to 1,979 cu.ft./acre). This amount would increase when considering incidental blowdown after treatment, tops from snag creation, and tops trees left on site after treatment.

United States   Forest   Southwest Oregon   2606 Old Stage Rd.
Department of Service   Forest Insect and Disease   Central Point, OR 97502
Agriculture   Service Center

Attachment 3

Reply to: 3400

Date: March 4,2000

Subject: Insect Assessment, Camas Creek LSR Density Management Project

Attention: Jim Kowalick

On Feb. 22, 2000, 1 visited the Coos Bay District, Bureau of Land Management to examine stands in the proposed Camas Creek Late Successional Reserve Density Management Project area. The purpose of the trip was to consult with BLM managers about possible insect implications of cutting substantial numbers of Douglas-firs and leaving them on the ground.

The objective of the proposed treatment is to accelerate development of large tree/old-growth characteristics in the LSR by thinning young stands. The thinning would be done in some 22 stands over a total area of about 1,300 acres. The project would involve thinning from below in mainly 40-to 50-year-old, predominantly Douglas-fir stands. Proposed treatment areas are interspersed with old-growth stands and privately owned timber lands. A high proportion of the trees to be cut would be 10 to 15 inches in diameter, and 60 to 200 trees per acre would be cut.

If large numbers of Douglas-firs were cut and left on the site, there is a high likelihood that mortality resulting from Douglas-fir beetle (Dendroctonus pseudotsugae) infestation would interfere with managers abilities to meet treatment objectives. Some points to consider about the epidemiology of Douglas-fir beetle include:

I) Under normal circumstances, Douglas-fir beetles do not infest and kill green healthy Douglas-firs. Rather, small endemic populations of these beetles survive in greatly weakened trees, especially trees in root disease centers. Douglas-fir beetles are present in low numbers in weakened trees in several black stain root disease pockets in the Camas Creek area.

2) On occasion, Douglas-fir beetle populations may increase to epidemic proportions. Outbreaks are triggered by events that produce large numbers of weakened hosts all at one time. Fires may occasionally set off population increases, but major wind or snow events that cause many trees to topple or break much more commonly do so. Cutting trees and leaving the logs on site creates the same kind of condition as a blow-down event from the prospective of Douglas-fir beetles.

3) Douglas-fir beetles will infest down Douglas-firs of 10 inch diameter or greater and will produce brood. Down trees occurring under a still-standing canopy provide optimal breeding habitat since beetles prefer and are most successful on down material that is shaded, cool, and moist.

4) Douglas-fir beetles occurring in the vicinity will attack down Douglas-firs in the spring of the year after the trees come down (usually from April to June). They are able to detect stressed or downed trees over considerable distances. Douglas-fir beetles have a one-year life cycle, and the new brood will emerge from the down trees in the spring of the subsequent year. If there are enough of them, Douglas-fir beetles emerging from down logs can infest standing trees.

5) Douglas-fir beetle infestation of green trees occurs when brood has emerged from a fairly substantial number of down trees. Based on past experience, the threshold appears to be at least 4 down Douglas-firs$\geq$ 10 inches diameter per acre. The more down hosts there are and the larger the size of the down trees, the greater the likelihood that emerging beetles will infest green trees and the larger the number of trees that will likely be infested.

6) Number of green Douglas-firs that are infested by beetles emerging from down trees is usually a function of the number of down trees that the beetles breed in. Generally, in the year that the beetles emerge from down Douglas-firs, one standing green tree is infested for every 3 down trees. The next year, one additional host is infested for every 4 to 5 Douglas-firs that were attacked in the first year, and in the third year, one additional green tree will be infested for every 25 that were infested the year previously. Outbreaks usually subside in the fourth year. During the entire course of an outbreak, 4 standing green trees can be expected to be infested for every 10 down infested Douglas-firs.

7) Most commonly, beetle-caused mortality of standing Douglas-firs will be concentrated fairly near the downed trees initially attacked by the beetles. However, Douglas-fir beetles are strong fliers, and in a certain percentage of eases (10 to 20 percent), they infest trees one to 5 miles away from where they emerge.

8) During outbreaks when Douglas-fir beetles infest standing green trees, they often show a preference for the largest Douglas-firs in a stand and also often cause concentrated mortality, killing all of the trees in patches that vary in size from ¼ to 2 acres.

Considering the above-mentioned points, it is my professional opinion that thinning the stands in the Camas Creek LSR and leaving the down trees on the ground would greatly jeopardize BLM's ability to attain the desired objective of accelerating development of old-growth character in the stands. It might also have very undesirable impacts in stands near the treatment areas. The treatment would create perfect conditions for Douglas-fir beetle population increases by providing large numbers of down trees of the proper size classes for brood production. There are Douglas-fir beetles in the area that potentially would infest the down trees and produce brood. Beetles emerging from the down trees could be expected to kill substantial numbers of leave trees, and, as well could kill trees in adjacent old-growth stands and on neighboring private properties. Mortality patterns would be unpredictable. By killing the largest Douglas-firs and Douglas-firs in groups, desired stand structure and required crown closure would be negatively impacted. The treatment would be very ill advised.

If it is absolutely necessary to leave large numbers of cut Douglas-firs on the ground in a thinning treatment in the Camas Creek area while retaining live Douglas-firs on the site, one possible approach might involve use of the Douglas-fir beetle2 antiaggregation phermone methylcyclohex (MCH). This material is registered for use by the EPA and is being tested for protecting standing and down Douglas-fir from attacks by Douglas-fir beetle at a number of locations across the West. It has not yet been tested in Southwest Oregon. Treatments involve attaching bubble caps containing the material to two trees per acre in a systematic fashion across an area where trees are to be protected. Reservations about using an MCI-I treatment in the Camas Creek area include high cost, lack of prior testing of the product in this part of Oregon, and concerns about potential effects to surrounding stands. If MCI-I was to be used, it should first be tested on a much smaller area than the proposed project area.

/s/ Donald J. Goheen
Entomologist/Plant Pathologist
Southwest Oregon Forest Insect and Disease Service Center